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RULEMAKINGS AND
ADJUDICATIONS STAFFComments on DG-1136 and Proposed Rule (Vol. 70, No. 43, FR dated 3/7/2005)
RIN 3150 AH-54 and DG-1136

(2)

1. DG-1136, Section B, "Background," states in the last sentence of the second paragraph, "The requirements for separation of cables and equipment associated with redundant hot shutdown trains were promulgated in paragraph III.G.2." This statement is misleading and may cause confusion. As stated later in this section paragraph III.G.2 applies only to the separation requirements within a given fire area as no section of Appendix R specifies the separation requirement for redundant safe shutdown components in separate fire areas. This is an important distinction and is part of the reason Generic Letter 86-10 clarified that "fire area" as used in Appendix R means an area sufficiently bounded to withstand the hazards associated with the area and, as necessary, to protect important equipment within the area from a fire outside the area. The distinction between fire area boundary separation and separation within a fire area allows the licensee to evaluate fire area boundaries for adequacy when they are not completely sealed floor-to-ceiling, wall-to-wall boundaries without the need for formal NRC approval under the exemption process. In addition, the rating of the fire area boundary is determined by the licensee based on the fire hazards analysis and the rating is not established by regulations (i.e., there is no requirement for a minimum 3-hour fire rating or additional measures such as fire detection and automatic fire suppression if the barrier is not 3-hour fire rated). Recommend adding a clarifying phrase to this sentence as follows, "...redundant hot shutdown trains within a fire area were promulgated...".
2. DG-1136, Section B, "Background," states in the last sentence of the sixth paragraph, "Currently, operator manual actions are not an alternative specified in paragraph III.G.2 of Appendix R." This statement is made in light of NRC experience with licensee resolutions to Thermolag fire barrier issues, which in that light is a generally correct assessment. However, as noted in the next paragraph, but not expounded upon, is the fact that licensees were using manual actions prior to the Thermolag issue being raised and these actions were not intended to meet paragraph III.G.2, but rather paragraph III.G.1. Paragraph III.G.1 states, "Fire protection features shall be provided for structures, systems, and components important to safe shutdown." Further, paragraph III.G.1.a, states, "One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage..." The general understanding of this section was that if manual operator actions could be taken, such as manual operation of a motor operator valve located in a separate fire area from where circuits may be affected by a fire, then the affected circuits were not "important to safe shutdown" and the train was "free of fire damage". Even the current definition of "free of fire damage" in NUREG-1778, can be met by this understanding. Since licensees, and the NRC, had previously accepted manual actions in meeting III.G.1, there was an understanding by the licensees' that this would be acceptable to resolve Thermolag issues and that the use of Thermolag to provide III.G.2 separation was in fact unnecessary when reasonable manual actions in a separate fire area could be used, since this condition met III.G.1 criteria. Therefore, the main premise for this draft Regulatory Guide and the proposed rule to resolve the operator manual action issue is a revision of prior licensee and NRC understanding of Appendix R. In summary, the previous industry understanding is that reasonable manual actions in separate fire areas from the fire area of concern meet the III.G.1 option of achieving and maintaining hot shutdown conditions from either the control room or emergency control station(s) because the circuit was not "important to safe shutdown" and the component was "free of fire damage" since it was capable of

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Comments on DG-1136 and Proposed Rule (Vol. 70, No. 43, FR dated 3/7/2005)
RIN 3150 AH-54 and DG-1136

performing the intended function during and after the postulated fire. Therefore, in general, the manual actions previously used by licensees were not intended to meet or replace III.G.2 requirements and no conflict with the regulations existed based on the above understanding of III.G.1 requirements. Note the NRC acceptance of manual actions in meeting the III.G.1 "free of fire damage," requirement was established as early as 1983 (see SECY-83-269, Attachment C, NRC Staff Positions on Post Fire Shutdown Capability, dated July 5, 1983). Therefore, it is recommended that no change to the current regulations is required based on the above understanding of Appendix R as implemented by numerous licensees' and the NRC, in the past.

3. DG-1136, Section C.1, "Rule Acceptance Criteria," identifies that, "The timeline should extend from the time of initial fire detection until licensee is able to achieve and maintain hot shutdown." Later sections provide more details on how this is to be accomplished, but a fundamental question is not addressed by this draft regulatory guide. Specifically, what is the success criterion for such an analysis? Appendix R, Section III.L., provides requirements for alternative and dedicated shutdown areas, but no such guidance is provided for other areas. As stated in the Federal Register, Vol. 70, No. 43, page 10905, "For alternative or dedicated shutdown capability, the reactor coolant system process variables should be maintained within those predicted for a loss of normal ac power and fission product boundary integrity should not be affected." This criteria, currently provided in 10CFR50, Appendix R, Section III.L, is contradictory and ambiguous (i.e., should licensees' maintain process variables within those predicted for a loss of normal ac or ensure fission product boundary should not be affected, these are very different criterion) such that the NRC and licensees' have trouble coming to agreement on what is meant by this section, so it is not an appropriate criterion for this purpose. This regulatory guide should either provide the criterion or point to an external source of guidance so that the NRC inspectors and licensee personnel will have a consistent basis for confirming success on the timeline. A reasonable approach would be to require the licensees' to ensure that an unrecoverable plant condition does not occur during the post-fire safe shutdown. An unrecoverable plant condition could be defined as the loss of any shutdown function(s) for such duration as to ultimately cause the reactor coolant level to fall below the top of the reactor core and lead to a subsequent breach of the fuel cladding. Or as stated in the Federal Register, Vol. 70, No. 43, page 10905, "The primary objective for safe shutdown is to maintain fuel integrity (i.e., fuel design limits are not exceeded)." This definition would cover PWR's and BWR's since a short term reactor coolant level below the top of the fuel for BWR's would not lead to fuel damage and is considered in the proposed criterion. In summary, a clear and unambiguous criterion for success should be provided in the regulatory guide (not just the Federal Register) for the licensees' to perform the necessary thermal-hydraulic analysis to support the boundaries for the required timeline.
4. DG-1136, Section C.2.4, "Equipment Functionality and Accessibility," discusses the need to ensure that equipment necessary to achieve and maintain post-fire hot shutdown is not damaged or otherwise adversely affected by the postulated fire. The section goes on to say that fire detection and suppression equipment to the extent the equipment contributes to the assurance of safe shutdown under fire conditions must be included. Clearly fire detection is provided to alarm when a fire is detected, but damage to this equipment is likely to occur shortly after the alarm is activated and this will not adversely affect the safe shutdown process. In addition, fire sprinkler systems are designed to control a fire (prevent the spread,

Comments on DG-1136 and Proposed Rule (Vol. 70, No. 43, FR dated 3/7/2005)
RIN 3150 AH-54 and DG-1136

but not necessarily to extinguish the fire) to provide more time for the occupants to evacuate the area safely. Sprinkler systems are also used in III.G.2 to supplement a less than 3-hour fire rated barrier separation of redundant safe shutdown components within the same fire area and allow time for the fire brigade to extinguish the fire before redundant safe shutdown components are damaged. Therefore, a recommendation is made to either clarify this section to prevent future interpretation that fire detection and suppression systems must be fire wrapped or otherwise protected from the affects of a fire or remove the statement saying they must be included. Systems designed in accordance with NFPA standards should continue to be the primary requirement, or provide a documented evaluation for any NFPA code deviations. The need to include these components with other post-fire hot shutdown components is unnecessary and may lead to unanticipated interpretations that these systems need fire protection features beyond NFPA standards.

5. DG-1136, Section C.2.4, "Equipment Functionality and Accessibility," includes a statement that, "Other equipment such as even manual valves, could have fire-susceptible parts such as valve packing." This statement is contrary to past and current NRC guidance provided to the industry. Current NRC guidance in NUREG-1778 states in Section 6.4.4, that, "Exposure fire damage to manual valves and piping is not assumed to adversely impact their ability to perform their safe-shutdown function." The reference to manual valves should be deleted.
6. DG-1136, Section C.2.5 & C.3.5, "Available Indications," discusses the NRC update to inspection guidance in March 2003 that states, "Determine whether adequate diagnostic instrumentation, unaffected by the postulated fire, is provided for the operator to detect the specific spurious operation that occurred." An example is given that a decreasing pressurizer level could be due to spurious closure of an in-line MOV and that the licensee should provide additional indication to determine the specific valve. The logic exhibited in this discussion is a good example of how the NRC ratchets the industry with additional requirements not specifically required by regulations and that are not pertinent to post-fire safe shutdown risk reduction. The need for such additional indication to identify which valve spuriously closed is beyond the current plant design requirements. Each licensee is required to perform an analysis to identify which component(s) may be affected by the fire and provides procedures to identify necessary operator actions to counter any potential spurious operations so there would be no need to provide additional indication. If, as discussed in the example, pressurizer level is decreasing for a given fire location, then required plant procedures already inform operations personnel what actions to take in order to recover pressurizer level, no matter what the cause, in a risk prioritized sequence. Additional indication would not alter these actions or priority and would be unnecessary. However, the stated NRC inspection guidance and this regulatory guide will encourage NRC inspectors to go beyond what is reasonably required to meet the regulations and challenge the licensee to prove that their current configuration is adequate. This guidance wastes NRC and licensee resources without significant risk reduction benefit. While it is clear that some minimum set of indications are required to adequately perform post-fire safe shutdown operations, the logic exhibited in this section goes beyond what should be considered reasonable. It is recommended that the minimum set of available indications remain as previously established by post-fire safe shutdown NRC guidance documents and that additional "nice to have" items not be identified in this regulatory guide to cause further confusion as to what is needed by licensees' and possibly cause additional cost to be incurred with no significant risk reduction benefit.

Comments on DG-1136 and Proposed Rule (Vol. 70, No. 43, FR dated 3/7/2005)
RIN 3150 AH-54 and DG-1136

7. DG-1136, Section C.3, "Additional Guidance for Meeting the Acceptance Criteria," includes the same concern raised on Section C.1, above, about not providing a suitable success criteria for the thermal-hydraulic calculations needed as a basis for ensuring operator actions are timely. No additional discussion will be provided on this concern since this is adequately addressed in the comment on Section C.1, above. However, an additional concern was identified as the details of this section includes conservative assumptions at each stage (bounding calculations, diagnostic time, implementation time, consideration of worst case environmental hazards, etc.) of the process compounded with the addition of a minimum multiplier of 2 for the time margin to show acceptable results. When a licensee determines the time available to perform the operator actions to meet the, yet to be defined, success criteria the analysis will include conservatism to address uncertainty invariably associated with such analyses. This conservatism results in a bounding short time for operator action to ensure the success criteria will always be met. Separately, the actual timing of the operators in performing the actions is conservatively extended to address differences between personnel, and includes consideration of impediments that may occur as a result of the postulated fire, or fire fighting activities. If the licensee performs the analyses conservatively and includes reasonable conservatism on the timed operator actions, then there is no need to include an additional "time margin" such as described here as this becomes unreasonable and will not add significant risk reduction benefits. The focus of this section should be on how to ensure conservative analyses are performed to determine the time available to perform safe shutdown actions and how to provide realistically conservative operator performance timing of the necessary actions. If this is done then an arbitrary "time margin" will not be needed and the results will provide reasonable assurance that a post-fire safe shutdown can be performed without requiring an unreasonable burden on the licensee resources with no significant risk benefit. A recommendation is made to remove the separate time margin factor and concentrate on developing reasonable bounding guidance on each step of the process in developing a comprehensive time line. A time margin factor has not been required for other plant accidents scenarios covered by emergency operating procedures and should not be imposed for the postulated fire related safe shutdown events.
8. DG-1136, Section C.3, "Additional Guidance for Meeting the Acceptance Criteria," includes discussion that covers the need to address equipment failures at various times after the fire occurs, and the need to evaluate a range of fires, fire locations, and fire effects. This approach is overly complicated and unnecessary when the process is focused on defining a single bounding worst case scenario. As stated in the Generic Letter 86-10, NRC response to question 5.2.1, "Since the extent of the fire cannot be predicted, it seems prudent to have the post-fire shutdown procedures guide the operator from full system availability to the minimum shutdown capability." Therefore, the scope of this section is beyond what is needed to define a single bounding analysis and provide procedures that will bound all postulated scenarios. If, instead of the proposed approach, the licensees' are encouraged to focus on a single "bounding" scenario, then the NRC and licensee will be better able to agree on the adequacy of the analysis. If separate analyses are performed for each individual possibility there will always be a question of whether some other combination should have been analyzed and create the need to perform additional analyses to confirm the scope of analyses are all encompassing. A recommendation is made to change this section to focus on how to better define a single worst case scenario that is bounding. For example, nuclear

Comments on DG-1136 and Proposed Rule (Vol. 70, No. 43, FR dated 3/7/2005)
RIN 3150 AH-54 and DG-1136

plants are designed to mitigate one worst case single failure after a loss of all off-site power so when each safe shutdown (SSD) system is analyzed to be lost (one at a time) the minimum operator response time is established to restore the lost SSD system. This approach bounds any combination that can be postulated on the timing of the loss, since by definition a loss at the initial stages will produce the shortest allowable response time due to the higher decay heat that must be removed to ensure fuel integrity. This straightforward approach will be easier to confirm by the NRC and is bounding without trying to "what if" all the possible combinations that should have been performed using the guidance provided in this draft regulatory guide.

9. Federal Register Vol. 70, No. 43, page 10903, Section III. "Proposed Action", describes the logic behind requiring fire detectors and automatic fire suppression systems concurrent with the use of allowed operator actions in the proposed Appendix R, Section III.G.2.c-1. In summary, the logic presented compares the manual actions to the other separation requirements of III.G. 2 that are less than 3-hour fire rate barrier separations. The scope of III.G.2 is to address the lack of separation between redundant safe shutdown components within a given fire area. The sections of III.G.2 that include the need for fire detection and an automatic fire suppression system are clearly to supplement the lack of 3-hour fire barrier separation between the redundant safe shutdown components within the same fire area. Since the allowed manual action is to be performed in a separate fire area outside where the fire is postulated to occur, the need for fire detection and automatic fire suppression to compensate for lack of a 3-hour fire rated barrier is not consistent. The allowed manual action is a replacement for the redundant component located in the postulated fire area, yet the manual action is located in a separate fire area, so the requirements of III.G.1 would apply and no additional fire detection and automatic fire suppression would be necessary. The allowable manual action is not part of an alternative shutdown approach since it is using the existing system as it was designed to be used. The location of the allowed manual action in a separate fire area ensures a much larger physical separation than components within the same fire area. In addition, the adequacy of the fire rated barrier around the fire area is assured by the fire protection program and does not require supplemental fire detection and automatic fire suppression per current NRC guidance or regulations. Therefore, the proposed regulation should not impose additional fire detection and automatic fire suppression using logic that is deterministic and not applicable to the circumstances when no significant risk reduction will be provided. This additional requirement appears punitive and has no reasonable deterministic or risk informed basis for being imposed. Since this is a proposed new rule it should consider risk significance and not maintain the deterministic approach of the original rule. As stated on page 10904 of the Federal Register notice, "The NRC believes that codifying this alternative in the rule will be more efficient than using the exemption process, and will provide for enhanced safety by allowing resources to be focused on safety rather than administrative compliance." The imposition of the need for fire detection and automatic fire suppression for allowable manual actions will result in numerous exemption requests due to the unnecessary burden it places on licensees' without risk reduction benefit. The proposed rule would then likely create the need for additional exemption requests which goes against a primary objective in issuing the proposed rule.
10. Federal Register Vol. 70, No. 43, page 10908, Section III. "Proposed Action", under a subheading "Procedures and Training," & subheading "Procedural Guidance vs. Guidance,"

Comments on DG-1136 and Proposed Rule (Vol. 70, No. 43, FR dated 3/7/2005)
RIN 3150 AH-54 and DG-1136

states in both sections, "The Commission expects plant procedures to be available at or near the locations where the operator manual actions are to occur so that they are easily accessible to the operators." This expectation is not identified in the draft regulatory guide and is an unreasonable expectation. The location of procedures should be in a central location so that when operators located in various areas outside the main control room are called upon to respond, they will always know where to go for the set of procedures that address all potential fire locations. If procedures are located near the locations where the actions are to occur, then multiple locations will have to be remembered and a higher human error rate could be expected. This statement should be removed from the final rule Federal Register notice or revised to be less restrictive.

11. Request for Comment 1 (Time Margin): A separate comment is provided to question the need for any time margin over and above the conservatisms introduced in each step of the timeline development. However, a response to each issue raised by the NRC is provided under the assumption that a time margin will be imposed. Response to question (A): The basis for this response is an understanding that the time margin being proposed is additional time added after T2 on the timeline, which must not exceed the time available to take action, which is identified as T3. The need to use either a single multiplicative value or a range of values is closely tied to how T3 was determined. In other words, will there already be plenty of margin to ensure plant safe shutdown if T3 is met without imposing additional time margin beyond T2. The appropriateness of how T3 was to be determined was not addressed by the expert panel and is a fundamental concern that prevents any meaningful determination of an appropriate time margin value. This weakness must be addressed and a clear basis provided for how T3 is to be determined before requesting the value or values that would be appropriate for an adequate time margin. In some cases, T3 has been determined using conservative thermal hydraulic analyses that would likely reduce the appropriate time margin well below a factor of 2 (may even be 0) for some licensees. When a consistent standard is established for defining T3, then an expert panel will be able to determine a meaningful value for an appropriate time margin. One of the main reasons the expert panel chose such a large time margin appears to be the uncertainty associated with how T3 is derived. A recommendation is made to establish a standardized set of criteria for determining T3 and then revisit the need for, and magnitude of, any additional time margin beyond T2. Response to question (B): No comment on the basis for a range of values since the basis could not be determined until T3 is defined, as stated in the response to question (A), above. Response to question (C): There should not be a minimum additive time to address concerns that a multiplicative factor would not properly account for the required time margin. If the process used to establish T2 is reasonable and conservative, which it must be to pass licensee and NRC scrutiny, then the variability being addressed by any additional time margin must be a consistent factor. It should be noted that T2 does not represent an individual operator performance that must be adjusted for all other operators, but rather T2 will be established to address reasonable variances between a population of operators and will already account for most, if not all, of the variability between individual operators. Response to question (D): As noted in the response to question (A) the value of T3, which is based on thermal-hydraulic analyses, must be better defined for consistency among licensees. The definition of how a licensee determines T3 could provide enough conservatism such that no additional time margin beyond T2 would be needed. For example, the ultimate goal of the thermal-hydraulic

Comments on DG-1136 and Proposed Rule (Vol. 70, No. 43, FR dated 3/7/2005)
RIN 3150 AH-54 and DG-1136

analysis is to ensure no fuel damage (maintain fuel integrity), but a more conservative parameter could be established that provides reasonable margin to fuel damage and would negate the need to add additional time margin to the T2 values. One option to consider would be a thermal-hydraulic analysis goal of ensuring that a loss of subcooling within the primary system does not occur and this would be used to establish T3. If the timing of operator actions (T2) show that this conservatively established T3 value could be met, then no additional time margin would be needed since a loss of subcooling would not lead to fuel damage for a considerable time in any reasonable post-fire safe shutdown scenario (no LOCA's are assumed). However, if the T2 value would not support the conservatively established T3 (loss of subcooling), then the thermal-hydraulic analysis would be performed to determine how long is available before fuel damage would occur and some reasonable time margin should then be added to T2 to provide a cushion to the T3 value which has limited conservatism. In summary, a standard set of guidelines should be established for how the thermal-hydraulic analysis will be performed to determine T3 and this standardization will either allow the success criterion to be that the value of T2 remains below T3 as being acceptable, or provide the basis for how much time margin should be added to T2 to ensure fuel integrity is not compromised.

12. Request for Comment 2 (Requirement for automatic versus fixed fire suppression system in the fire area): Although the need for either is questionable in conjunction with allowable manual actions (i.e., no commensurate risk reduction benefit to offset the added cost to install such a system), the use of automatic fire suppression would be more consistent with the other items in this section of Appendix R.
13. Request for Comment 2 (Should new manual action acceptance criteria for III.G.2 also be applied to III.G.1 and III.G.3?): The proposed acceptance criterion for III.G.2 is essentially a backfit from earlier licensee and NRC understanding of how III.G.1.a has been used in the past. In addition, the current difficulty in implementing differences between alternative shutdown acceptance criteria and safe shutdown acceptance criteria would only be further confused by specific acceptance criteria for manual actions allowed for III.G.2, but not necessarily for III.G.1.a or III.G.3. Therefore, if this proposed rule is to be issued, it should provide a consistent set of acceptance criteria for all manual actions allowed by Appendix R and go through the generic backfit analysis requirements.

From: Carol Gallagher
To: Evangeline Ngbea
Date: Wed, May 18, 2005 10:02 AM
Subject: Comment letter on Fire Protection Program - Post-Fire Operator Manual Actions

Van,

Attached for docketing is a comment letter on the above noted proposed rule that I received via the rulemaking website on 5/17/05. The commentor name and address are:

Larry D. Young
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Please note that the attached file also contains comments on a Draft Reg. Guide. The comments pertaining to the proposed rule begin about halfway through the comment.

Carol

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